



T0077-S Payload Isolation for Microgravity Research

Problem Statement

- Microgravity research on sRLVs requires isolation of the experiment from the milli-g flight environment of the host vehicle during free-fall.
- The Vibration Isolation Platform (VIP) provides a payload mounting interface with active stabilization and 6-DOF non-contact isolation.
- The VIP isolates the research experiment from vibrations & disturbances of the crew, host vehicle, or other experiments.
- The VIP is a capabilities enhancement for sRLVs, providing economical access to a high-quality microgravity environment. This enables a robust expansion of space research, commercialization, and scientific discovery.

Technology Development Team

- PI: Scott Green
Controlled Dynamics Inc.
sgreen@controlled-dynamics.com
- CDI Team: David Schenck, John Harduvel, Brian Weltmer, Bernie Javier.

Proposed Flight Experiment

Experiment Readiness:

- The VIP will be ready to fly in September 2013.

Test Vehicles:

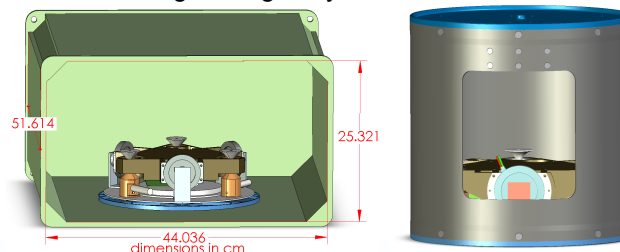
- Suitable for any sRLVs with sustained free-fall.

Test Environment:

- sRLV test flights characterize flight performance and enable custom tuning for each sRLV.

Test Apparatus Description:

- Flight tests will use an instrumented payload mass simulator. During launch, re-entry, and landing, the research payload is mechanically secured to the vehicle. During parabolic coast, the research payload is automatically released on a 6-DOF free-floating platform. The payload is caged to follow the low-frequency inertial motion of the host vehicle, but otherwise left undisturbed to float freely in the sway space of the VIP. A "µg OK" discrete signal is provided to the payload when the acceleration environment is acceptable for conducting microgravity research.



VIP shown in a middeck locker & a PTS10 Module

Technology Maturation

- The VIP is currently undergoing TRL-6 ground tests using a soft-suspension testbed to simulate microgravity operations.
- The FOP test flight campaigns mature the technology to TRL-9 through operational testing on each sRLV.

Objective of Proposed Experiment

- Flight qualify the VIP on each sRLV as a payload mounting interface for microgravity research experiments.
- The flight campaigns: (1) verify automatic despin cancelation of vehicle inertial rate; (2) verify autonomous release, isolation, and recapture; (3) measure performance during operation; (4) provide data for tuning and optimization.
- Once proven, the VIP mount will provide a sustained, high-quality microgravity environment for research experiments flying on any sRLV.